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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Application No.	Filed:	Inventor(s):	Atty. Dkt.:
09/828,519	6 APR 2001	Andrew W. Lo et al.	1869-003A [056225-5003]

Title: DATA PROCESSOR FOR IMPLEMENTING FORECASTING ALGORITHMS	

Examiner: Felten, Daniel S.	Art Unit: 3624

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Commissioner for Patents
P.O. Box 1450
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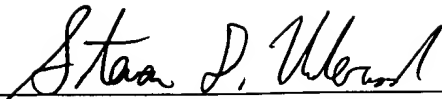## COVER LETTER FOR RE-SUBMITTED APPEAL BRIEF

The enclosed Appeal Brief is respectfully re-submitted in response to the Notice of Non-Compliance mailed September 26, 2006. The enclosed Brief is essentially the same as that submitted previously, and is being re-submitted merely to correct certain informalities.

In particular, the Brief has been amended to add statute and claim information to the grounds for rejection and to the corresponding headings in the argument section, and the exhibit is now referenced as Evidence.

Please charge all required fees to Deposit Account No. 50-0310. Since this Appeal Brief was previously filed on September 20, 2005 (and May 17, 2006), Applicants believe that the $500 Appeal Brief fee should not be charged again.

Respectfully submitted,

I-NY/2097877.1

09/262,716

Dated: October 16, 2006

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APPEAL BRIEF (PURSUANT TO 37 CFR 41.37)

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Real Party in Interest

The real party in interest is the Massachusetts Institute of Technology of Cambridge,

Massachusetts.

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Related Appeals and Interferences

There are no other prior or pending appeals, interferences, or judicial proceedings known to appellant, appellant's legal representatives, or assignee that may be related to, directly affect, or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

One claim was filed with the application; claims 2-14 subsequently were added. Claims 11-14 were withdrawn in response to a restriction requirement. Claims 1-10 are pending and stand rejected. The rejections of claims 1-10 are being appealed.

Status of Amendments

No amendments were filed after the final rejection and before this Appeal Brief.

Summary of Claimed Subject Matter

The present invention comprises a system and method for implementing forecasting algorithms. Claim 1 is directed to a system for pattern recognition in price data. The system comprises: (a) a database for storing price data in system addressable format; (b) a data processor for generating a non-linear relationship having a smooth, curvilinear characteristic for a range of data within the selected interval; (c) a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data; and generating a results output based on a recognition of said pattern, if any.

Note that the original claims form part of the disclosure, and that claim 1 is essentially as filed (the claim has been amended only to correct a spelling error). However, as discussed below, additional support may be found in the specification.

Specifically, claim 1 comprises: a database means for storing said price data in system addressable format, wherein said price data is organized for processing into a non-linear relationship (page 6, lines 16-20; page 15, lines 14-15; FIG. 1, item 10);

a data processor responsive to price data stored in said database and capable of generating said non-linear relationship having a smooth, curvilinear characteristic for a range of data within said interval (page 5, lines 15-18; page 6, lines 20-22; FIG. 1, item 30);

a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data; and generating a results output based on a recognition of said pattern, if any (page 6, lines 20-23; FIG. 1, item 40)

Claim 2 is to the system of claim 1 wherein real-time price data is inputted from commercial financial data vendors (page 6, lines 9-12).

Claim 3 is to the system of claim 1 wherein said database means includes means for storing price data taken from end of day trading records (page 15, lines 21-23; FIG. 1, item 10).

Claim 4 is to the system of claim 1 wherein said database means includes means for storing trading volume and trade size data (page 6, lines 9-10; FIG. 1, item 10).

Claim 5 is to the system of claim 1 further comprising means for testing prediction characteristics, via convergence criteria and adjusting system parameters in response to said criteria (page 7, lines 19-21; not shown in the drawings).

Claim 6 has been re-written to be in independent form, but is to a system as in claim 1, further comprising programming to detect one or more broadening tops and broadening bottoms. (page 11, lines 10-15).

Claim 7 has been re-written to be in independent form, but is to a system as in claim 1, further comprising programming to detect one or more head and shoulders patterns. (page 11, lines 10-15).

Claim 8 has been re-written to be in independent form, but is to a system as in claim 1, further comprising programming to detect one or more triangle tops and triangle bottoms (page 11, lines 10-15).

Claim 9 has been re-written to be in independent form, but is to a system as in claim 1, further comprising programming to detect one or more rectangle tops and rectangle bottoms. (page 11, lines 10-15).

Claim 10 has been re-written to be in independent form, but is to a system as in claim 1, further comprising programming to detect one or more double tops and double bottoms. (page 11, lines 10-15).

Grounds of Rejection to Be Reviewed On Appeal

(A) Whether Castiglione, F., "Forecasting price increments using an artificial Neural Network." is prior art under 35 U.S.C. § 102 to claims 1-10; and

(B) Whether the Patent Office has asserted a proper motivation to combine U.S. Pat. No. 6,012,042, to Black et al. with U.S. Pat. No. 5,444,819, to Negishi and further with Castiglione, F., "Forecasting price increments using an artificial Neural Network." in order to establish a *prima facie* of obviousness under 35 U.S.C. § 103 against claims 1-10.

Argument

The Final Office Action ("Office Action") being appealed provides insufficient support for rejecting claim 1, for example, over the combination of Black, Negishi, and Castiglione.

(A) Castiglione Does Not Appear to be Prior Art Under 35 U.S.C. § 102 to Claims 1-10

The subject application has a priority date of April 7, 2000. The article by Castiglione, as far as Applicants have been able to determine, was published in March 2001 (see attached Exhibit in the Evidence Appendix).

To be prior art, Castiglione would need to be published before April 7, 2000. Even though this was first pointed out to the Patent Office in a response mailed July 19, 2004, and has since been reiterated several times, both in writing and in direct telephone conversations with the Examiner, the Patent Office still has not provided any evidence to show that Castiglione is prior art. As a consequence, the § 103 rejections of claims 1-10, all of which are based on Castiglione, should be withdrawn.[1]

(B) No Proper Motivation Under 35 U.S.C. § 103 Has Been Provided for Combining the Three Cited References to Invalidate Claims 1-10

The Patent Office has not identified any proper justification for combining the three cited references. In response to Applicants' previous arguments that no proper motivation to combine the references was provided, the Office Action states (see page 3):

> In response to Applicant's argument that there is not suggestion to combine references, the examiner recognizes references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary references and secondary references

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[1] Applicants reserve the right to substantively address the Castiglione reference (or to swear behind it) if the Patent Office provides evidence that Castiglione was published early enough to qualify as prior art.

> [citation omitted]. However, there is no requirement that the
> motivation to make the modification be expressly articulated. The
> test for combining references is the combination of disclosures
> taken as a whole would suggest to one of ordinary skill in the art
> [see in re McLaughlin 170 USPQ 209 (CCPA 1971)].

The above statement ignores the other criteria for establishing a *prima facie* case of

obviousness (see MPEP § 2143), and does not explain how taking the cited references as a whole

provides a motivation to combine them.

In the previously mailed office action (mailed April 20, 2004), the Examiner argued:

> [B]ecause Black includes within the invention's process the technical
> analysis of price data, it would have been obvious for an artisan of ordinary skill
> in the art at the time of the invention of Black[2] to integrate/substitute the pattern
> recognition processor as well as the curve fitting technique disclosed within
> Negishi and Castiglione, as alternatives to Black's price data analysis because an
> artisan at the time of the invention of Black would have been motivated to use
> these (and various other) well known techniques to effectively analyze market
> price data and find new market trends..

The assertions quoted above are incorrect. The asserted "motivations" for combining

Black with the combination of Negishi and Castiglione are not supported by the prior art. None

of the references suggests that Black would be improved by substituting the teachings of Negishi

or the teachings of Castiglione (either separately or in combination) for Black's "price data

analysis." Indeed, it is not clear that combining Black with a combination of Negishi and

Castiglione would even result in an *operable* system or method, much less an *optimal* system or

method. A proposed combination "cannot change the principle of operation of the primary

reference or render the reference inoperable for its intended purpose." See MPEP § 2143.01.

The Office Action language quoted above is not sufficient to establish a *prima facie* case

of obviousness. The alleged suggestion or motivation to combine Black with a combination of

Negishi and Castiglione must be based on objective evidence in the record. See MPEP 2143.01 and *In re Lee*, cited therein (277 F.3d 1338, 1344-45, Fed. Cir. 2002)).

For at least the above reasons, the § 103 rejection of claim 1 over the combination of Black, Negishi, and Castiglione is improper and should be withdrawn. For at least the same reasons, the § 103 rejections of claims 2-10, all of which (explicitly or implicitly) depend from claim 1, are improper and should be withdrawn. It is therefore respectfully requested that the Board of Patent Appeals and Interferences reverse the rejection of these claims.

Please charge all required fees to Deposit Account No. 50-0310. Please note that this Appeal Brief was filed in a different format on September 20, 2005, and the $500 Appeal Brief fee should not be charged twice.

Respectfully submitted,

Dated: October 16, 2006

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2   Although a minor point, Applicants respectfully note that the test for obviousness relates to the time of Applicants' invention – not Black's invention. See, e.g., MPEP § 2141.01 (III).

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Claims Appendix

1. (Previously presented)   A system for processing price data corresponding to a sequence of time for a selected interval, said system comprising:

a database means for storing said price data in system addressable format, wherein said price data is organized for processing into a non-linear relationship;

a data processor responsive to price data stored in said database and capable of generating said non-linear relationship having a smooth, curvilinear characteristic for a range of data within said interval;

a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data; and

generating a results output based on a recognition of said pattern, if any.

2. (Previously presented)   The system of claim 1 wherein real-time price data is inputted from commercial financial data vendors.

3. (Previously presented)   The system of claim 1 wherein said database means includes means for storing price data taken from end of day trading records.

4. (Previously presented)   The system of claim 1 wherein said database means includes means for storing trading volume and trade size data.

5. (Previously presented) The system of claim 1 further comprising means for testing prediction characteristics, via convergence criteria and adjusting system parameters in response to said criteria.

6. (Previously presented) A system for processing price data corresponding to a sequence of time for a selected interval, said system comprising:

a database means for storing said price data in system addressable format, wherein said price data is organized for processing into a non-linear relationship;

a data processor responsive to price data stored in said database and capable of generating said non-linear relationship having a smooth, curvilinear characteristic for a range of data within said interval;

a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data and generating a results output based on a recognition of said pattern, if any; and

programming to detect one or more broadening tops and broadening bottoms.

7. (Previously presented) A system for processing price data corresponding to a sequence of time for a selected interval, said system comprising:

a database means for storing said price data in system addressable format, wherein said price data is organized for processing into a non-linear relationship;

a data processor responsive to price data stored in said database and capable of generating said non-linear relationship having a smooth, curvilinear characteristic for a range of data within said interval;

a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data and generating a results output based on a recognition of said pattern, if any; and

               programming to detect one or more head and shoulders patterns.

8.   (Previously presented)   A system for processing price data corresponding to a sequence of time for a selected interval, said system comprising:

               a database means for storing said price data in system addressable format, wherein said price data is organized for processing into a non-linear relationship;

               a data processor responsive to price data stored in said database and capable of generating said non-linear relationship having a smooth, curvilinear characteristic for a range of data within said interval;

               a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data and generating a results output based on a recognition of said pattern, if any; and

               programming to detect one or more triangle tops and triangle bottoms.

9.   (Previously presented)   A system for processing price data corresponding to a sequence of time for a selected interval, said system comprising:

               a database means for storing said price data in system addressable format, wherein said price data is organized for processing into a non-linear relationship;

a data processor responsive to price data stored in said database and capable of generating said non-linear relationship having a smooth, curvilinear characteristic for a range of data within said interval;

a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data and generating a results output based on a recognition of said pattern, if any; and

programming to detect one or more rectangle tops and rectangle bottoms.

10.   (Previously presented)   A system for processing price data corresponding to a sequence of time for a selected interval, said system comprising:

a database means for storing said price data in system addressable format, wherein said price data is organized for processing into a non-linear relationship;

a data processor responsive to price data stored in said database and capable of generating said non-linear relationship having a smooth, curvilinear characteristic for a range of data within said interval;

a pattern recognition processor for applying said smoothed non-linear relationship to discern the existence of one or more patterns of price-time data and generating a results output based on a recognition of said pattern, if any; and

programming to detect one or more double tops and double bottoms.

Evidence Appendix

The Evidence is the attached Exhibit – 3 pages showing that the Castiglione reference was published in March 2001.

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ADVANCES IN COMPLEX SYSTEMS

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FORECASTING PRICE INCREMENTS USING AN ARTIFICIAL NEURAL NETWORK

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Financial forecasting is a difficult task due to the intrinsic complexity of the financial system. A simplified approach in forecasting is given by "black box" methods like neural networks that assume little about the structure of the economy. In the present paper we relate our experience using neural nets as financial time series forecast method. In particular we show that a neural net able to forecast the sign of the price increments with a success rate slightly above 50% *can* be found. Target series are the daily closing price of different assets and indexes during the period from about January 1990 to February 2000.

Keywords: Forecasting, neural networks, financial time series, detrending analysis.

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<u>Related Proceedings Appendix</u>

None.